

CLAIMS

1. A high-strength and highly-wear-resistant sintered diamond object comprising sintered diamond particle having an average particle size of at most $2\mu\text{m}$ and a binder phase as a remaining portion, wherein

content of said sintered diamond particle in said sintered diamond object is at least 80 volume % and at most 98 volume %,

said binder phase contains at least one element selected from the group consisting of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, and molybdenum, of which content is at least 0.5 mass % and less than 50 mass %, and contains cobalt, of which content is at least 50 mass % and less than 99.5 mass %,

a part of said at least one element or said at least one element as a whole, the element being selected from the group consisting of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, and molybdenum, is present as carbide particle having an average particle size of at most $0.8\mu\text{m}$,

a texture of said carbide particle is discontinuous, and adjacent said diamond particles are bound to each other.

2. The high-strength and highly-wear-resistant sintered diamond object according to claim 1, wherein

said at least one element selected from the group consisting of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, and molybdenum is titanium, and

content of said titanium in said binder phase is at least 0.5 mass % and less than 20 mass %.

3. The high-strength and highly-wear-resistant sintered diamond object according to claim 1, wherein

a test piece is cut out from said sintered diamond object in a planar rectangular shape having a length of 6mm, a width of 3mm and a thickness in a range from at least 0.4mm to at most 0.45mm and used for measuring transverse rupture strength under a condition of 4mm span, and measured transverse rupture strength is at least 2.65GPa.

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4. The high-strength and highly-wear-resistant sintered diamond object according to claim 1, wherein

10 said test piece cut out from said sintered diamond object in a planar rectangular shape having a length of 6mm, a width of 3mm and a thickness in a range from at least 0.4mm to at most 0.45mm is subjected to dissolution treatment in a sealed container at a temperature in a range from at least 120°C to less than 150°C for 3 hours by using fluoro-nitric acid obtained by mixing 40ml of twice-diluted nitric acid having a concentration of at least 60% and less than 65% and 10ml of hydrofluoric acid having a concentration from 45 to 50%, and thereafter the test piece is used for measuring
15 transverse rupture strength under a condition of 4mm span, and measured transverse rupture strength is at least 1.86GPa.

5. The high-strength and highly-wear-resistant sintered diamond object according to claim 1, wherein

20 said at least one element selected from the group consisting of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, and molybdenum is titanium,

content of said titanium in said binder phase is at least 0.5 mass % and less than 20 mass %,

25 in an X-ray diffraction pattern of said sintered diamond object measured under a condition of acceleration of electron beam of 40kV, a current of 25mA, an angle of diffraction $2\theta = 20$ to 80° , and a scanning speed of $0.1^\circ\text{C}/\text{second}$, a diffraction beam of titanium carbide in a direction of (200) attains an intensity ratio of at least 3% and less

than 50% of a diffraction beam of diamond in a direction of (111).

6. The high-strength and highly-wear-resistant sintered diamond object according to claim 1, wherein

5 said sintered diamond object contains oxygen in an amount of at least 0.001 mass % and less than 0.15 mass %.

7. A method of manufacturing the high-strength and highly-wear-resistant sintered diamond object according to claim 1, wherein

10 sintering is performed under a condition of a pressure in a range from at least 5.7GPa to at most 7.5GPa and a temperature in a range from at least 1400°C to at most 1900°C, using a belt-type extra-high-pressure apparatus.

8. The method of manufacturing high-strength and highly-wear-resistant sintered diamond object according to claim 7, wherein

15 sintering is performed under a condition of a pressure in a range from at least 6.0GPa to at most 7.2GPa and a temperature in a range from at least 1400°C to at most 1900°C, using a belt-type extra-high-pressure apparatus.

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